

FIG. 1

FIG. 2

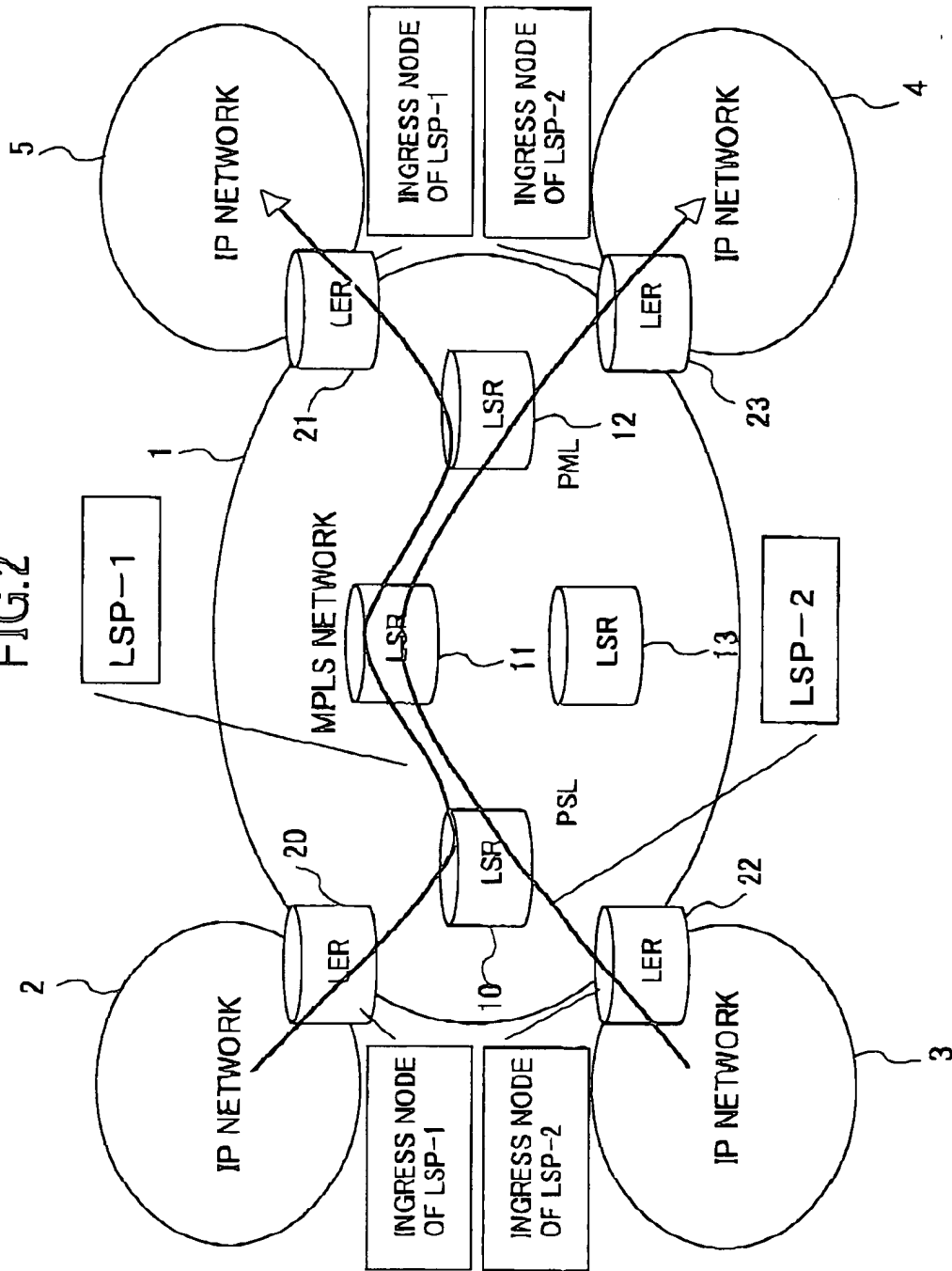


FIG.3

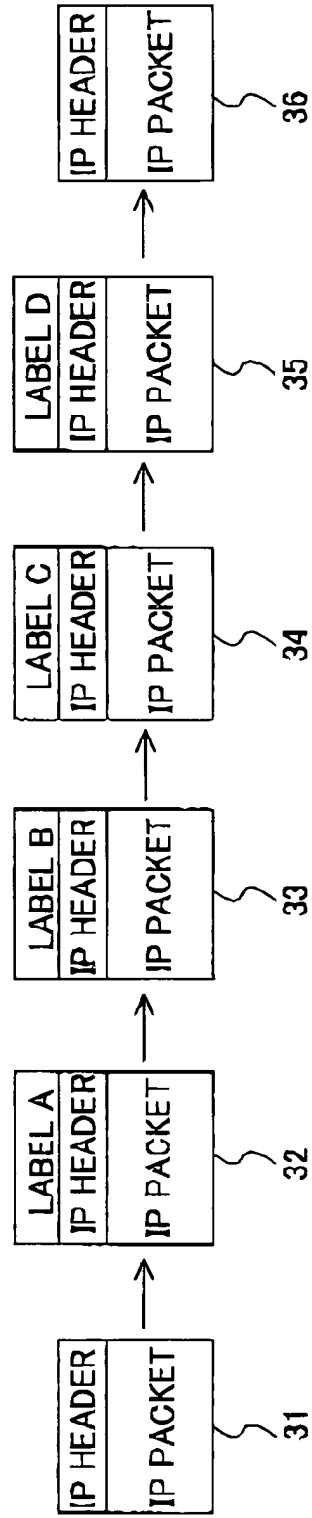


FIG.4

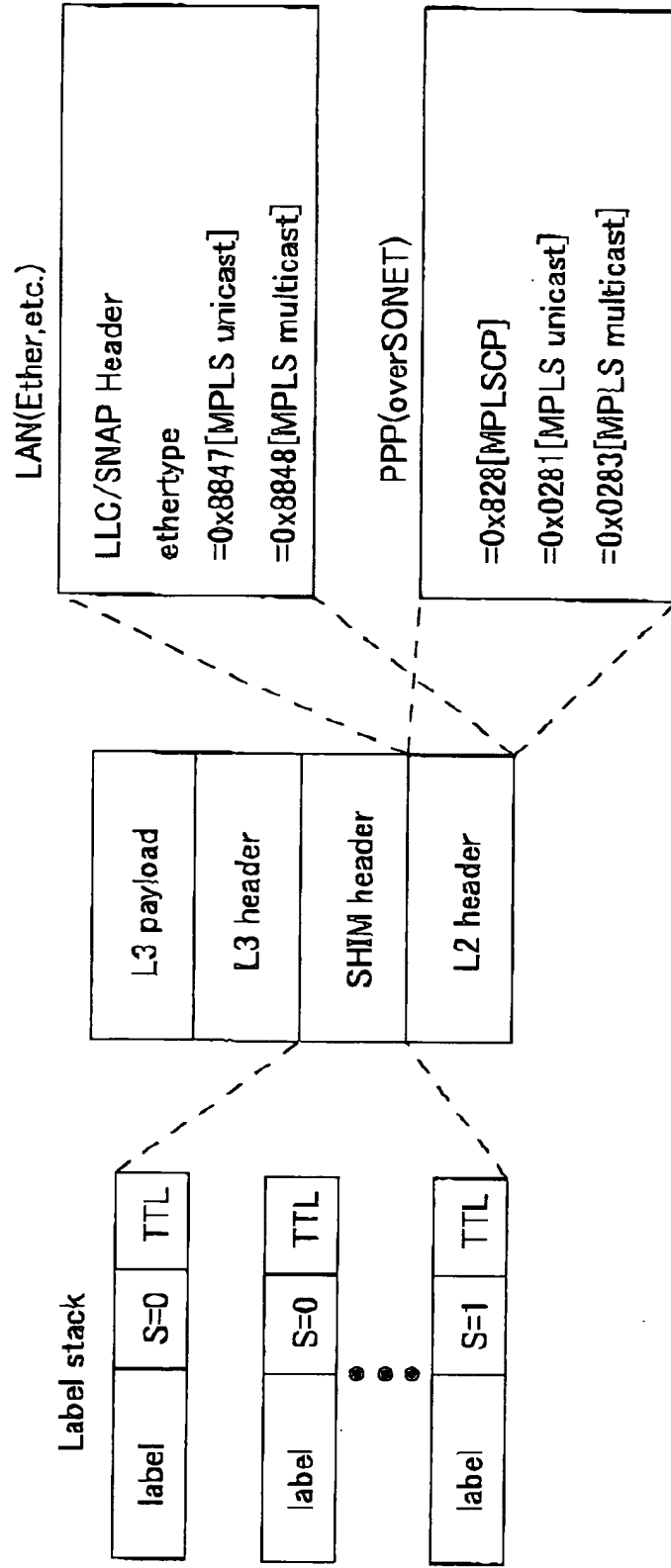
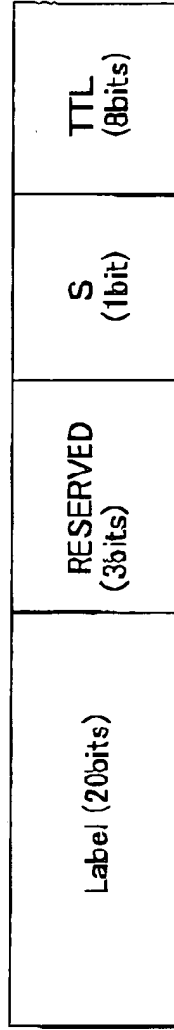


FIG.5



4 OCTETS

FIG.6

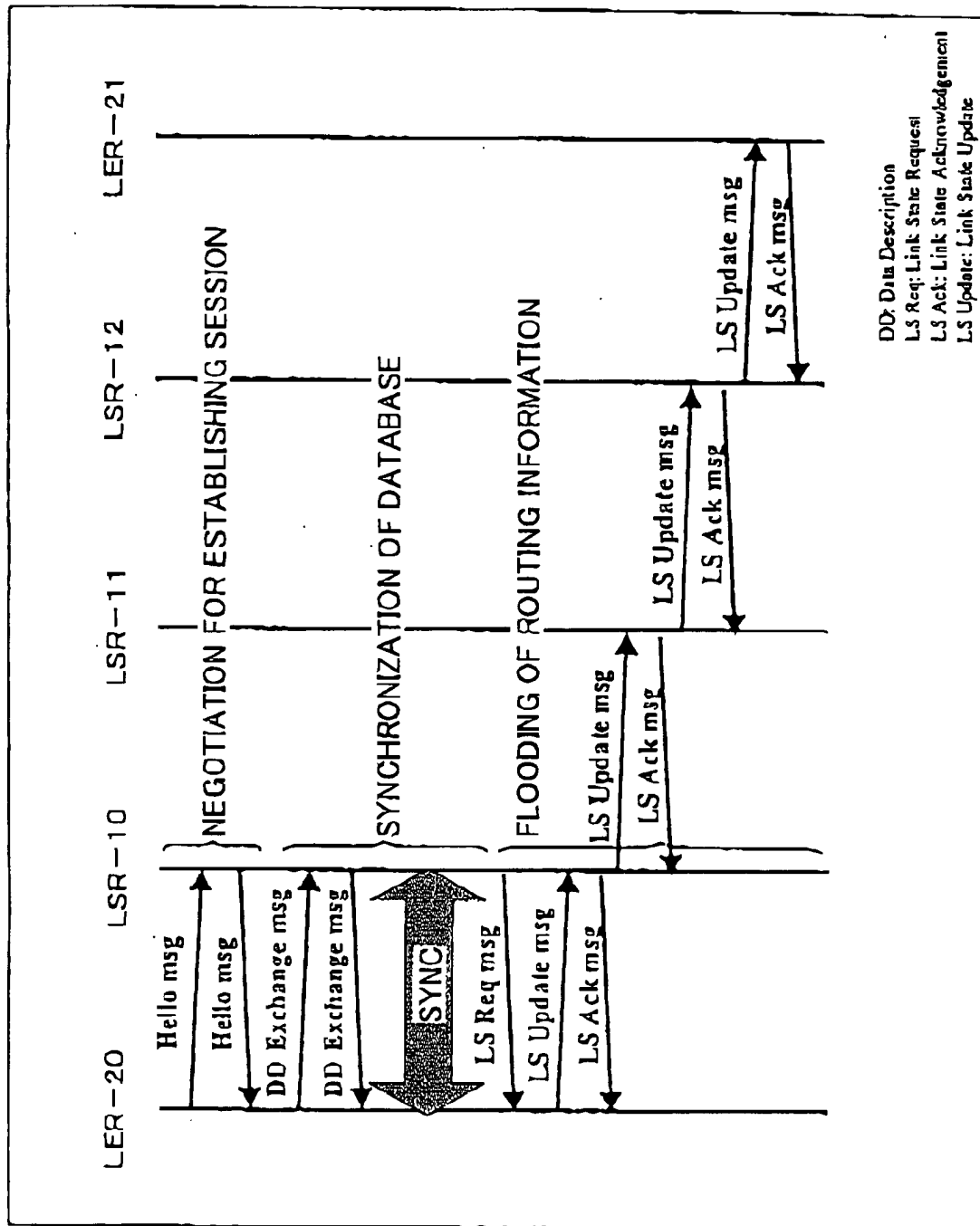


FIG.7

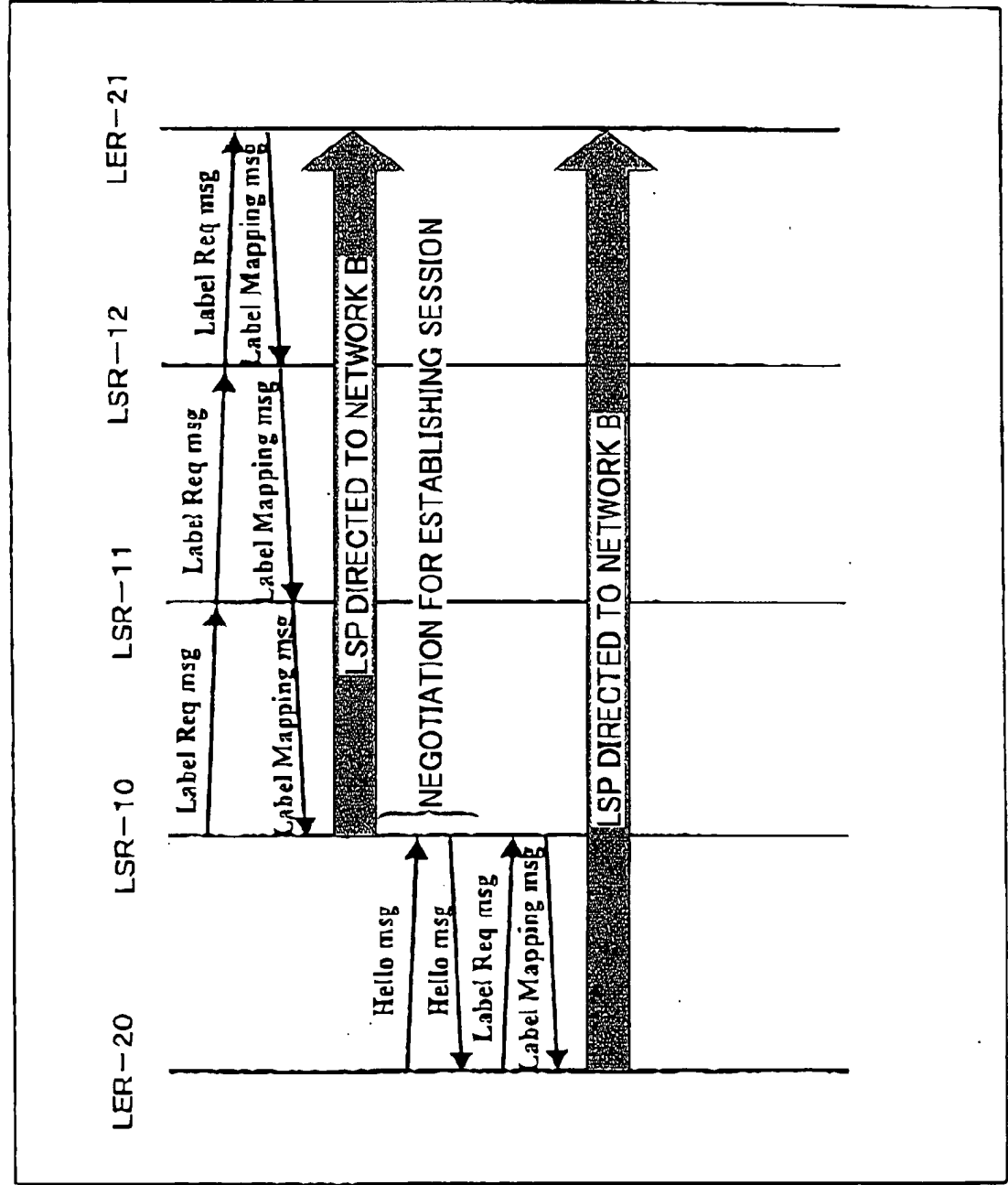


FIG.8

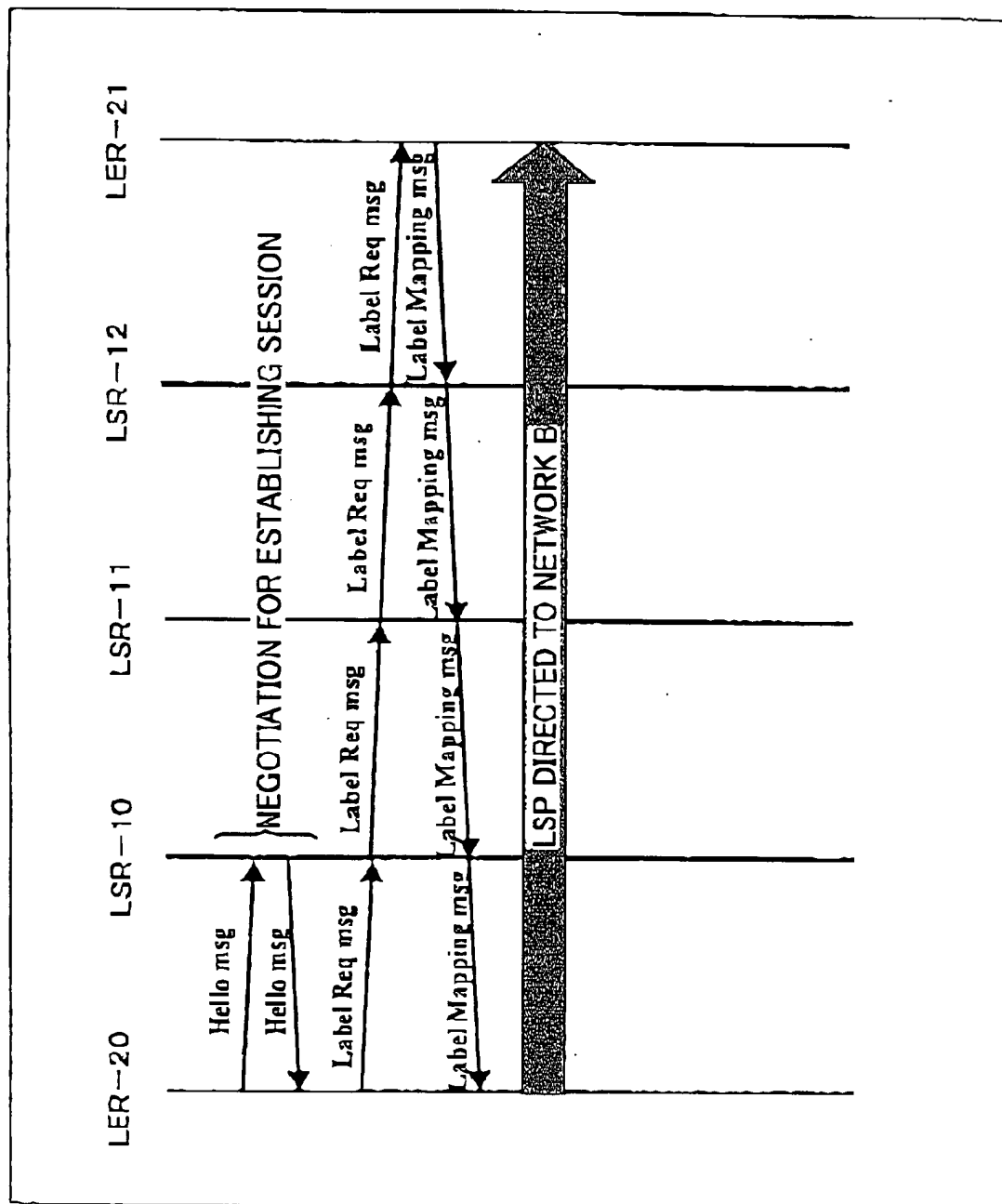




FIG.9

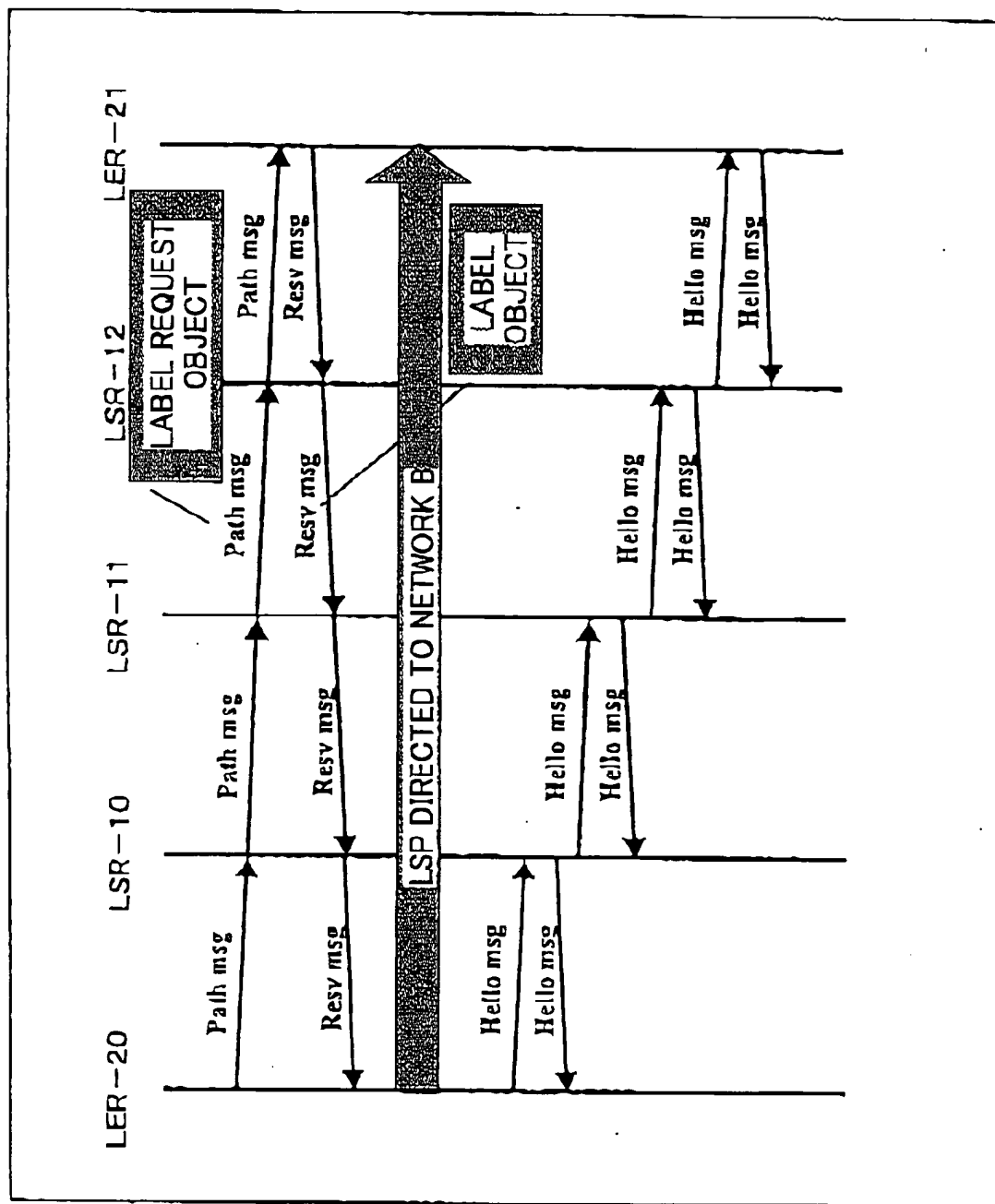


FIG.10A

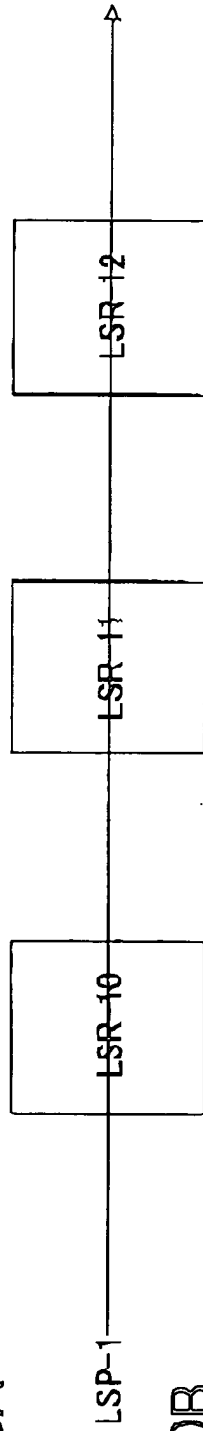


FIG.10B

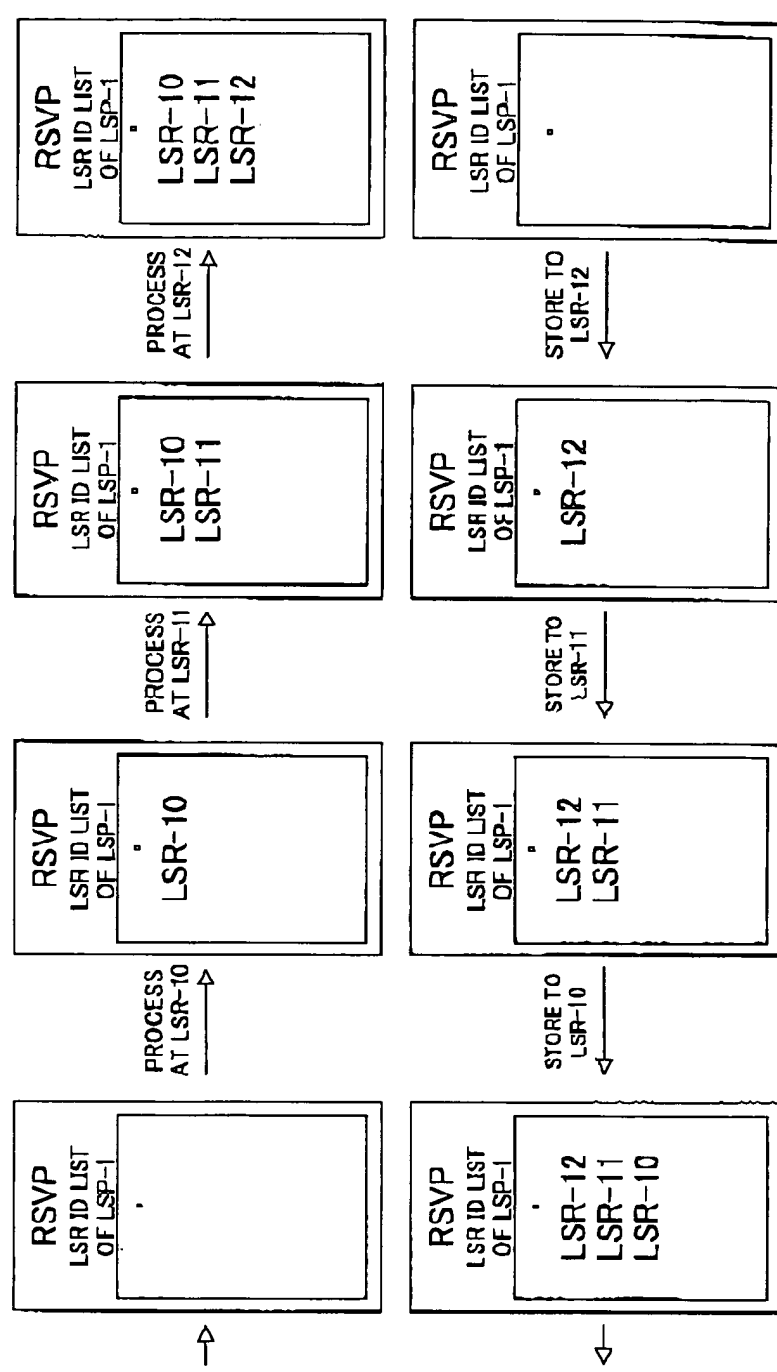
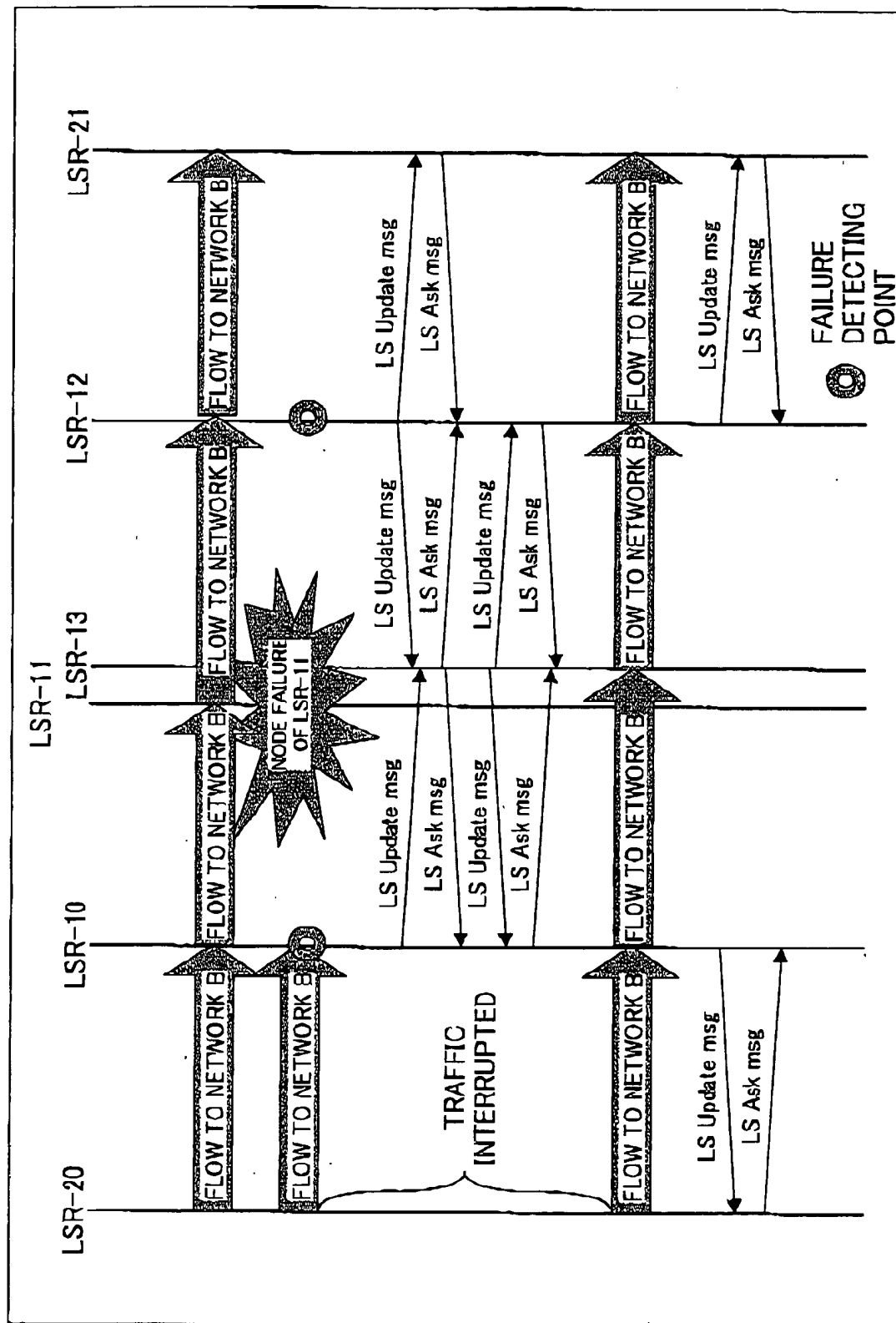


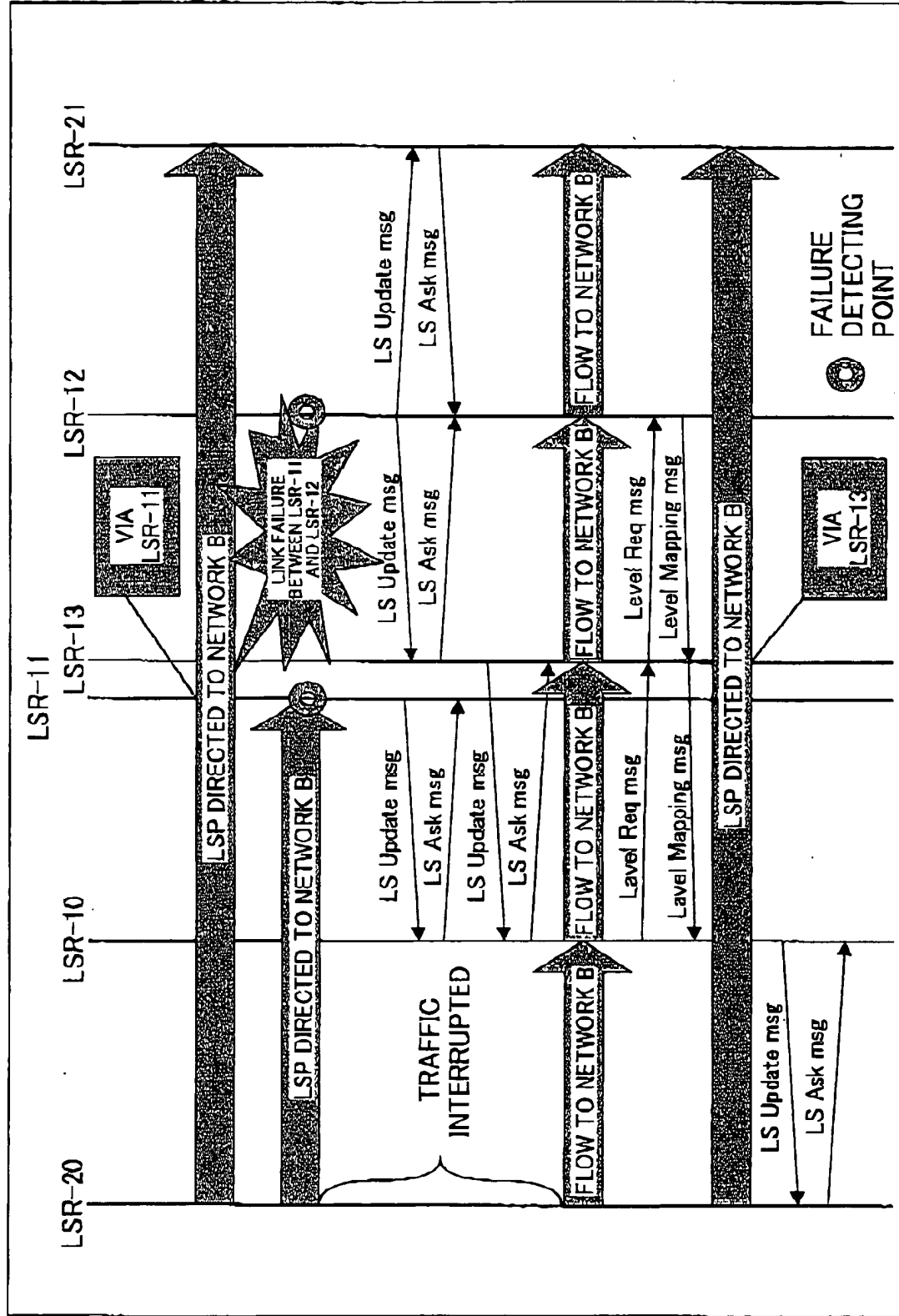
FIG.10C

The diagram illustrates the failure of a link between LSR-11 and LSR-12, and the subsequent recovery process. The diagram shows the flow of LS Update and LS Ask messages between LSR-20, LSR-10, LSR-13, LSR-12, and LSR-21. A 'LINK FAILURE BETWEEN LSR-11 AND LSR-12' is indicated by a starburst. A 'FAILURE DETECTING POINT' is marked on LSR-12. The diagram shows the interruption of traffic and the subsequent recovery process where LSR-20 sends LS Update and LS Ask messages to LSR-10, which then propagates them through LSR-13 and LSR-12 to LSR-21.

FIG.12



**FIG. 13**



The diagram illustrates the sequence of events following a node failure in a network. The participants are LSR-10, LSR-11, LSR-12, LSR-13, and LSR-20. The timeline shows the following steps:

- Initial State:** LSR-10 and LSR-11 are connected via LSR-13. LSR-12 and LSR-20 are also connected via LSR-13.
- Node Failure:** A starburst labeled "NODE FAILURE OF LSR-11" occurs at LSR-11.
- Traffic Interruption:** A bracket labeled "TRAFFIC INTERRUPTED" spans the period from the failure to the first recovery attempt.
- Recovery Attempt 1:** LSR-10 sends an "LS Update msg" to LSR-11. LSR-11 responds with an "LS Ask msg". This sequence is repeated.
- Recovery Attempt 2:** LSR-12 sends an "LS Update msg" to LSR-11. LSR-11 responds with an "LS Ask msg". This sequence is repeated.
- Failure Detecting Point:** A circle labeled "FAILURE DETECTING POINT" is located at LSR-12.
- Flow to Network B:** Arrows labeled "FLOW TO NETWORK B" indicate the direction of traffic from LSR-10 and LSR-12 towards the network.
- Level Mapping:** LSR-10 and LSR-12 send "Level Req msg" and "Level Mapping msg" to LSR-13.
- Final State:** LSR-10 and LSR-12 are now connected via LSR-13. LSR-13 is labeled "VIA LSR-13".

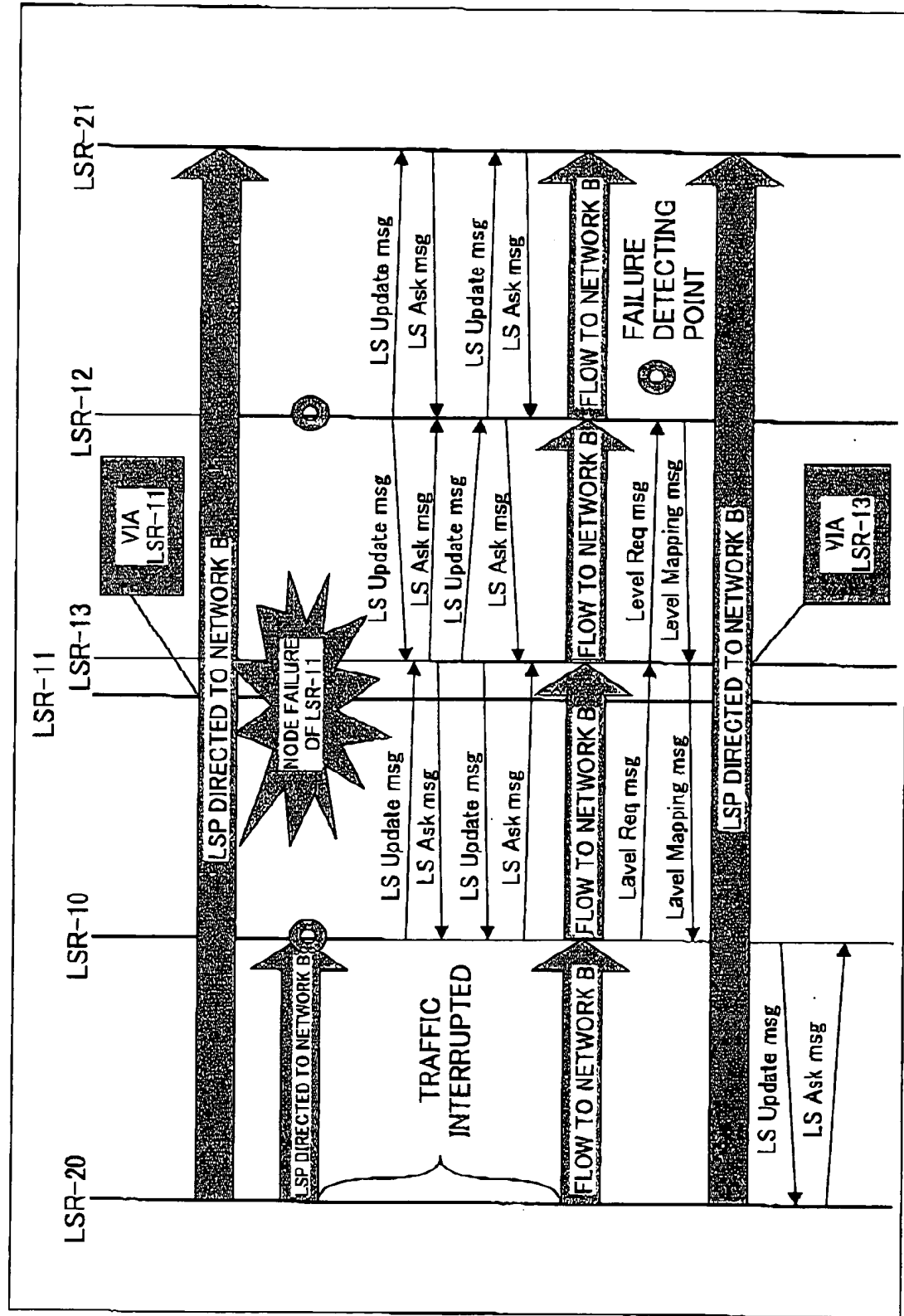


FIG.15

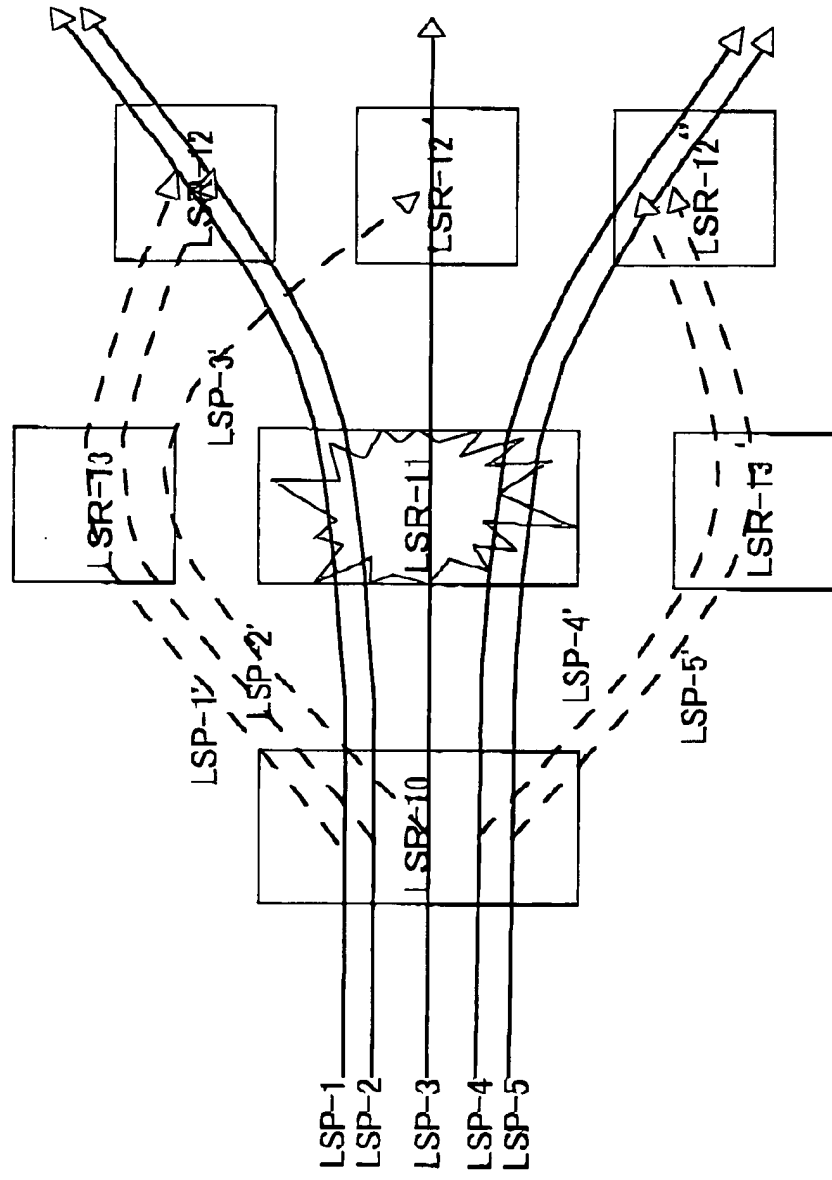
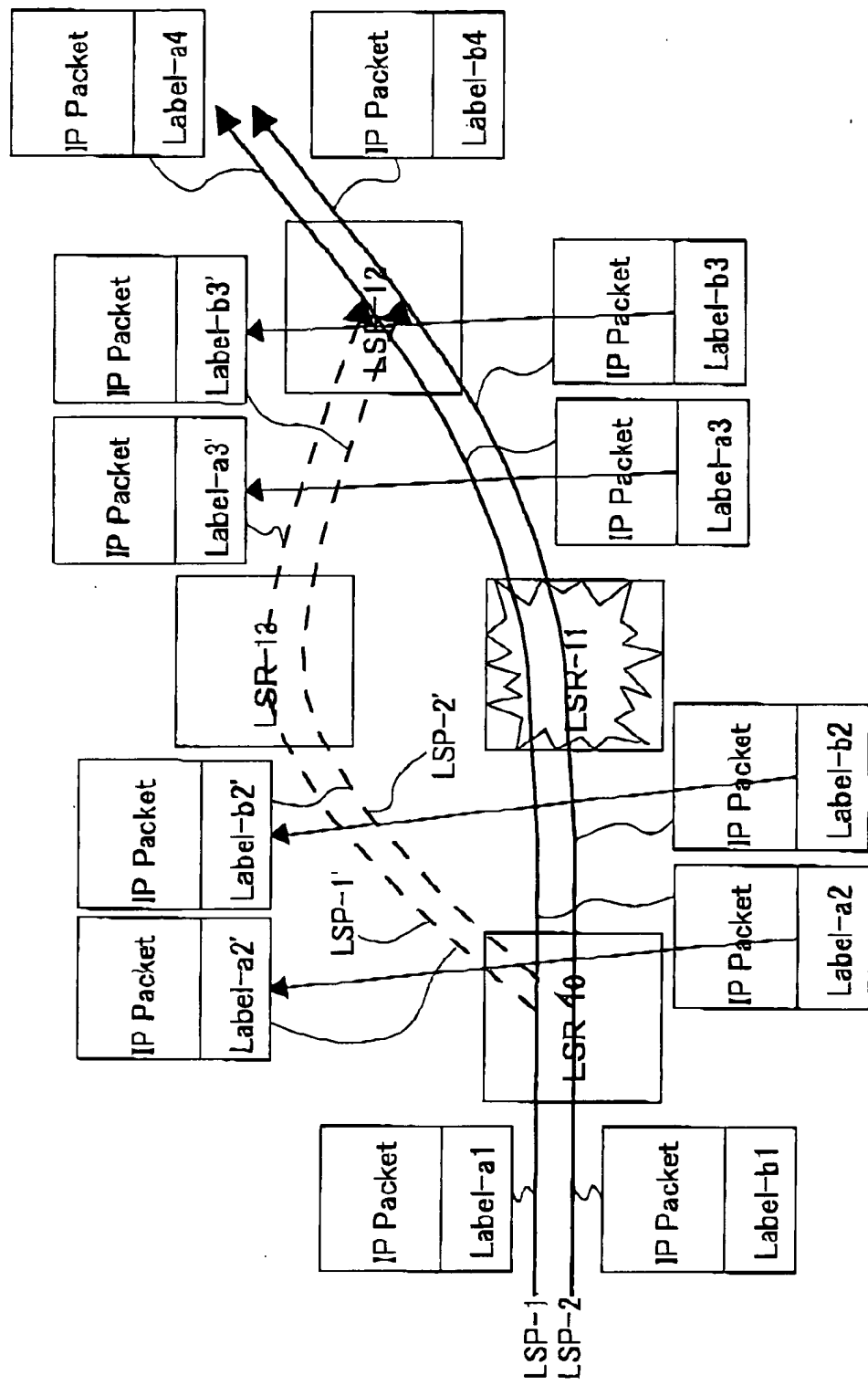


FIG. 16





The diagram illustrates the recovery process for a link failure between LSR-11 and LSR-12. The sequence of events is as follows:

- Initial State:** LSR-10, LSR-11, LSR-12, and LSR-21 are shown as vertical timelines.
- Link Failure:** A starburst icon labeled "LINK FAILURE BETWEEN LSR-11 AND LSR-12" occurs.
- Failure Detecting Point:** A circle with a dot on LSR-12 marks the "FAILURE DETECTING POINT".
- Recovery Path Setup:**
  - LSR-11 sends a "Level Req msg" to LSR-13.
  - LSR-13 sends a "Level Mapping msg" to LSR-11.
  - LSR-11 sends a "Level Req msg" to LSR-10.
  - LSR-10 sends a "Level Mapping msg" to LSR-11.
- LSP Directed to Network B:**
  - LSR-11 sends "LSP DIRECTED TO NETWORK B" to LSR-10.
  - LSR-10 sends "LSP DIRECTED TO NETWORK B" to LSR-11.
  - LSR-11 sends "LSP DIRECTED TO NETWORK B" to LSR-12.
  - LSR-12 sends "LSP DIRECTED TO NETWORK B" to LSR-11.
- Traffic Interrupted:** A bracket labeled "TRAFFIC INTERRUPTED" spans the period of the link failure.
- LS Update and Ask Messages:**
  - LSR-11 sends "LS Update msg" to LSR-10.
  - LSR-10 sends "LS Ask msg" to LSR-11.
  - LSR-11 sends "LS Update msg" to LSR-12.
  - LSR-12 sends "LS Ask msg" to LSR-11.
- Recovery Path Setup:**
  - LSR-11 sends "RECOVERY PATH SET UP" to LSR-12.
  - LSR-12 sends "RECOVERY PATH SET UP" to LSR-11.
- VIA LSR-11 and VIA LSR-13:** Arrows indicate the recovery path setup via LSR-11 and LSR-13.



FIG.19

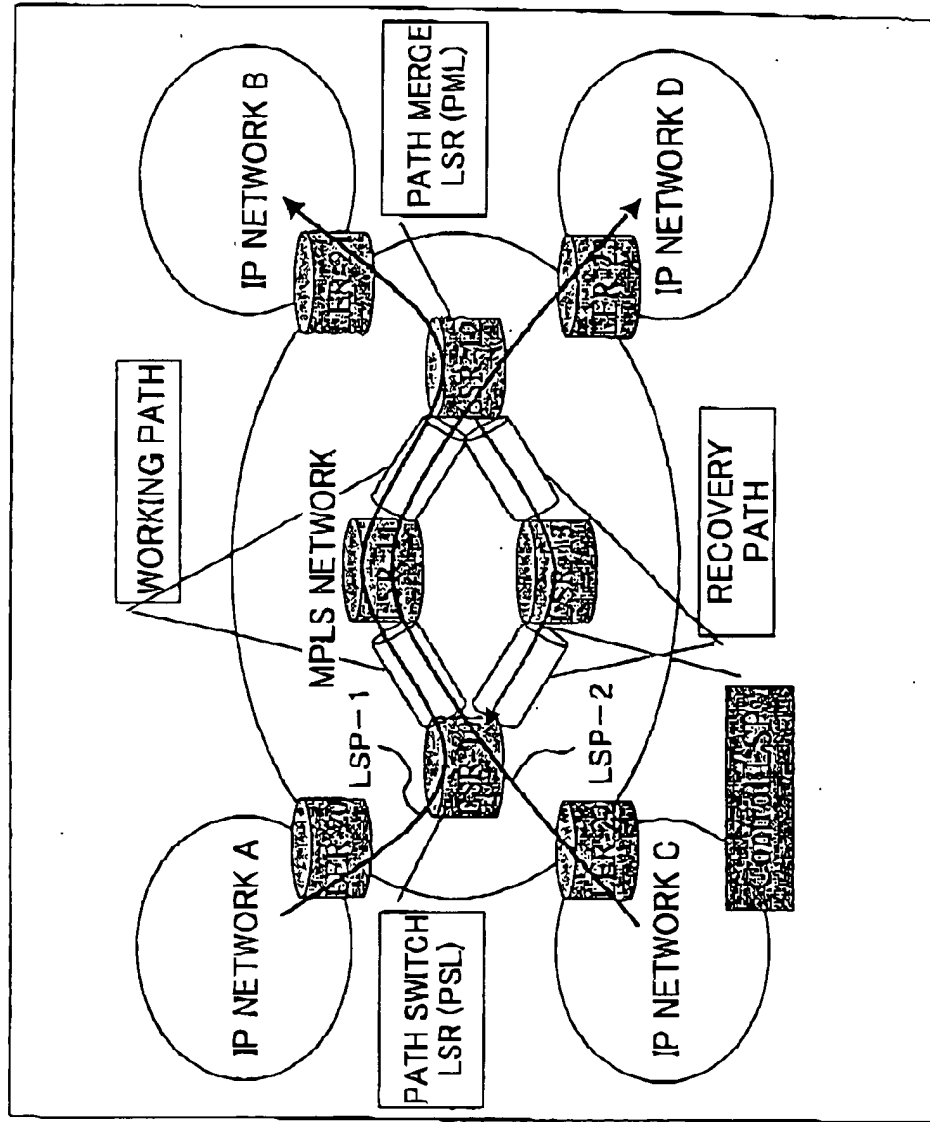


FIG.20A

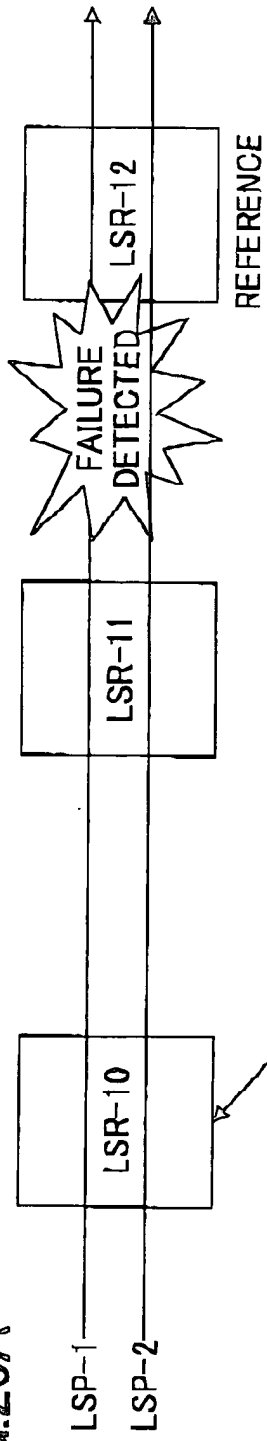


FIG.20B

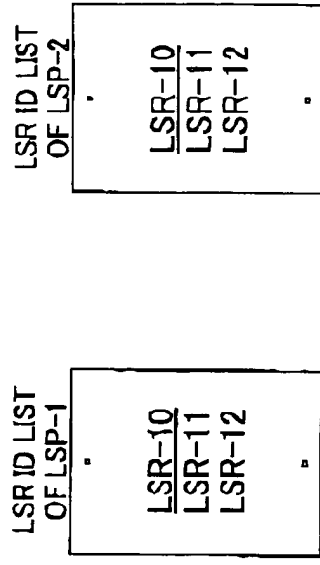
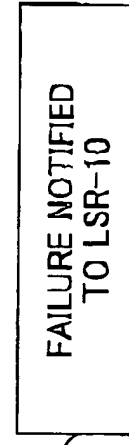


FIG.20C



NOTIFY

FIG.21A

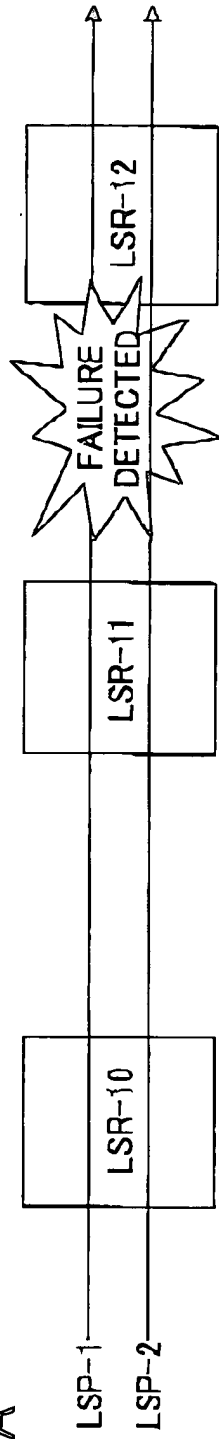


FIG.21B

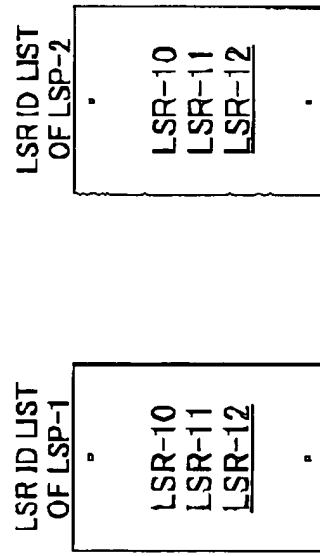


FIG.21C

PROCESS AS PG, BECAUSE  
SAME PATH MERGE LSR

FIG.22A

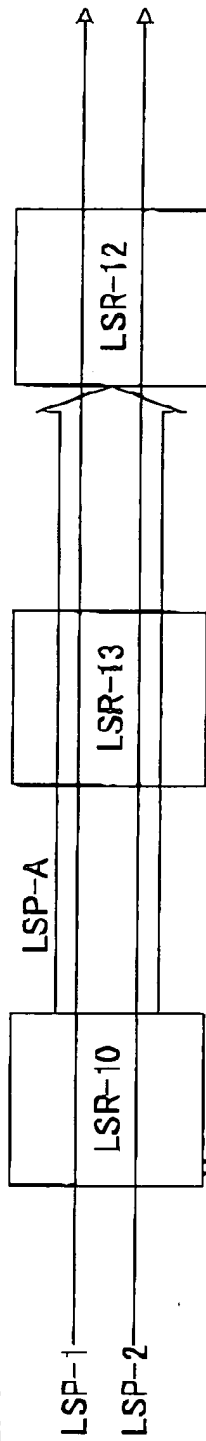


FIG.22B

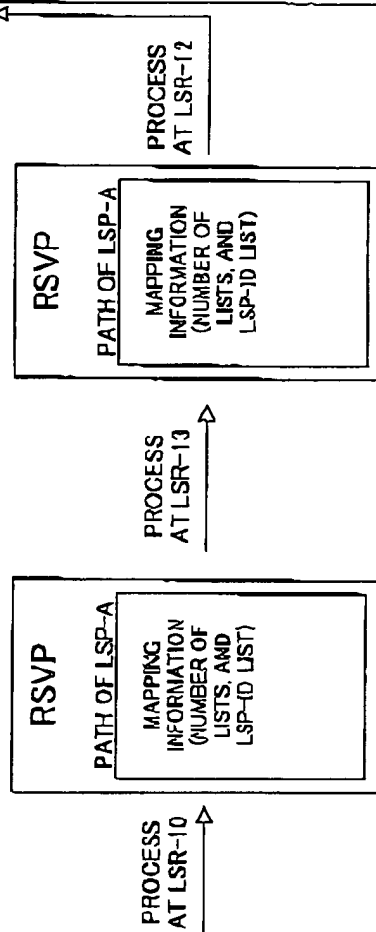


FIG.22C

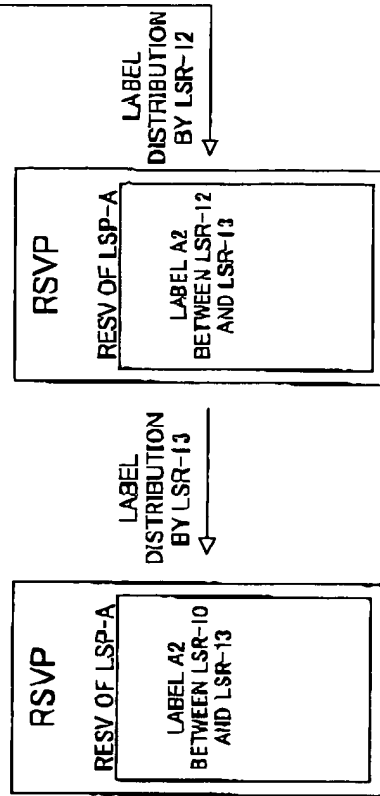


FIG.23A

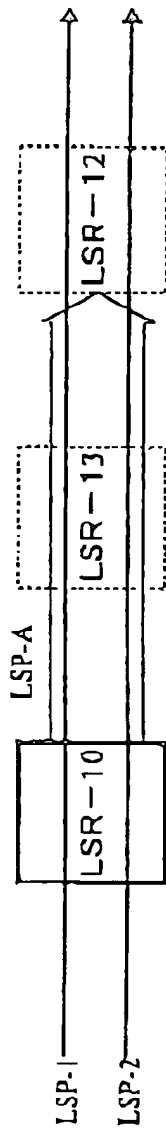


FIG.23B

|       | IN-PORT | IN-LABEL | Action | OUT-PORT | OUT-LABEL |
|-------|---------|----------|--------|----------|-----------|
| LSP-1 | 2       | a1       | swap   | 4        | a2        |
| LSP-2 | 3       | b1       | swap   | 4        | b2        |



FIG.23C

|       | IN-PORT | IN-LABEL | Action | OUT-PORT | OUT-LABEL |
|-------|---------|----------|--------|----------|-----------|
| LSP-1 | 2       | a1       | push   | 5        | A1        |
| LSP-2 | 3       | b1       | push   | 5        | A1        |

FIG.24A

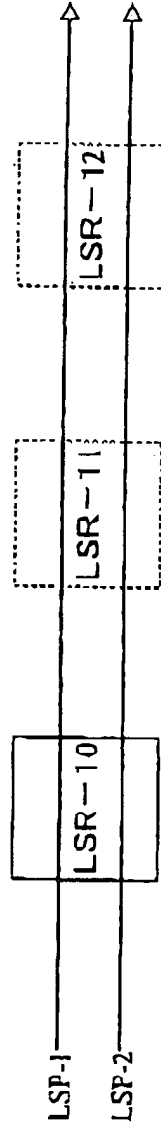


FIG.24B

| IN-PORT    | IN-LABEL | Action | OUT-PORT | OUT-LABEL |
|------------|----------|--------|----------|-----------|
| LSP-1<br>2 | a1       | push   | 5        | A1        |
| LSP-2<br>3 | b1       | push   | 5        | A1        |



FIG.24C

| IN-PORT    | IN-LABEL | Action | OUT-PORT | OUT-LABEL |
|------------|----------|--------|----------|-----------|
| LSP-1<br>2 | a1       | swap   | 4        | a2        |
| LSP-2<br>3 | b1       | swap   | 4        | b2        |



FIG.25A

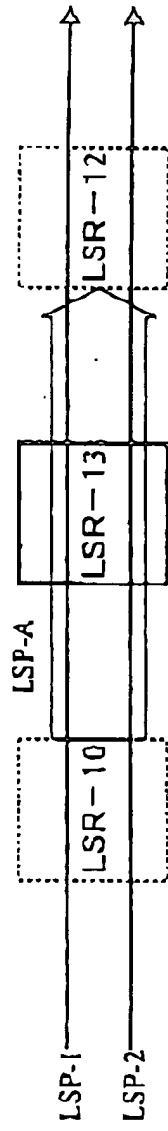


FIG.25B

| IN-PORT | IN-LABEL | Action | OUT-PORT | OUT-LABEL |
|---------|----------|--------|----------|-----------|
| 2       | A1       | swap   | 1        | A2        |

LSP-A

FIG.26A

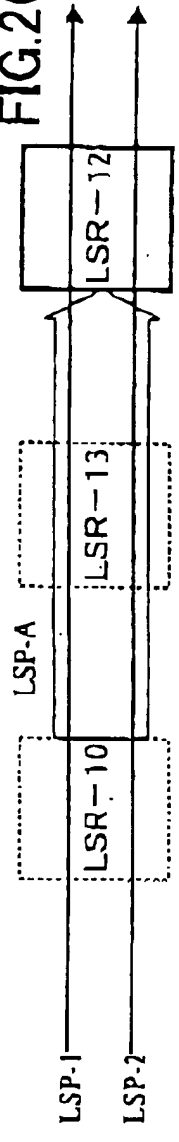


FIG.26B

|       | IN-PORT | IN-LABEL | Action | OUT-PORT | OUT-LABEL |
|-------|---------|----------|--------|----------|-----------|
| LSP-1 | 6       | a3       | swap   | 4        | a4        |
| LSP-2 | 6       | b3       | swap   | 4        | b4        |

FIG.26C



|       | IN-PORT | IN-LABEL | Action | OUT-PORT | OUT-LABEL |
|-------|---------|----------|--------|----------|-----------|
| LSP-A | 3       | A2       | pop    | -        | -         |
| LSP-1 | 3       | a2'      | swap   | 4        | a4        |
| LSP-1 | 6       | a3       | swap   | 4        | a4        |
| LSP-2 | 3       | b2'      | swap   | 4        | b4        |
| LSP-2 | 6       | b3       | swap   | 4        | b4        |

FIG.27

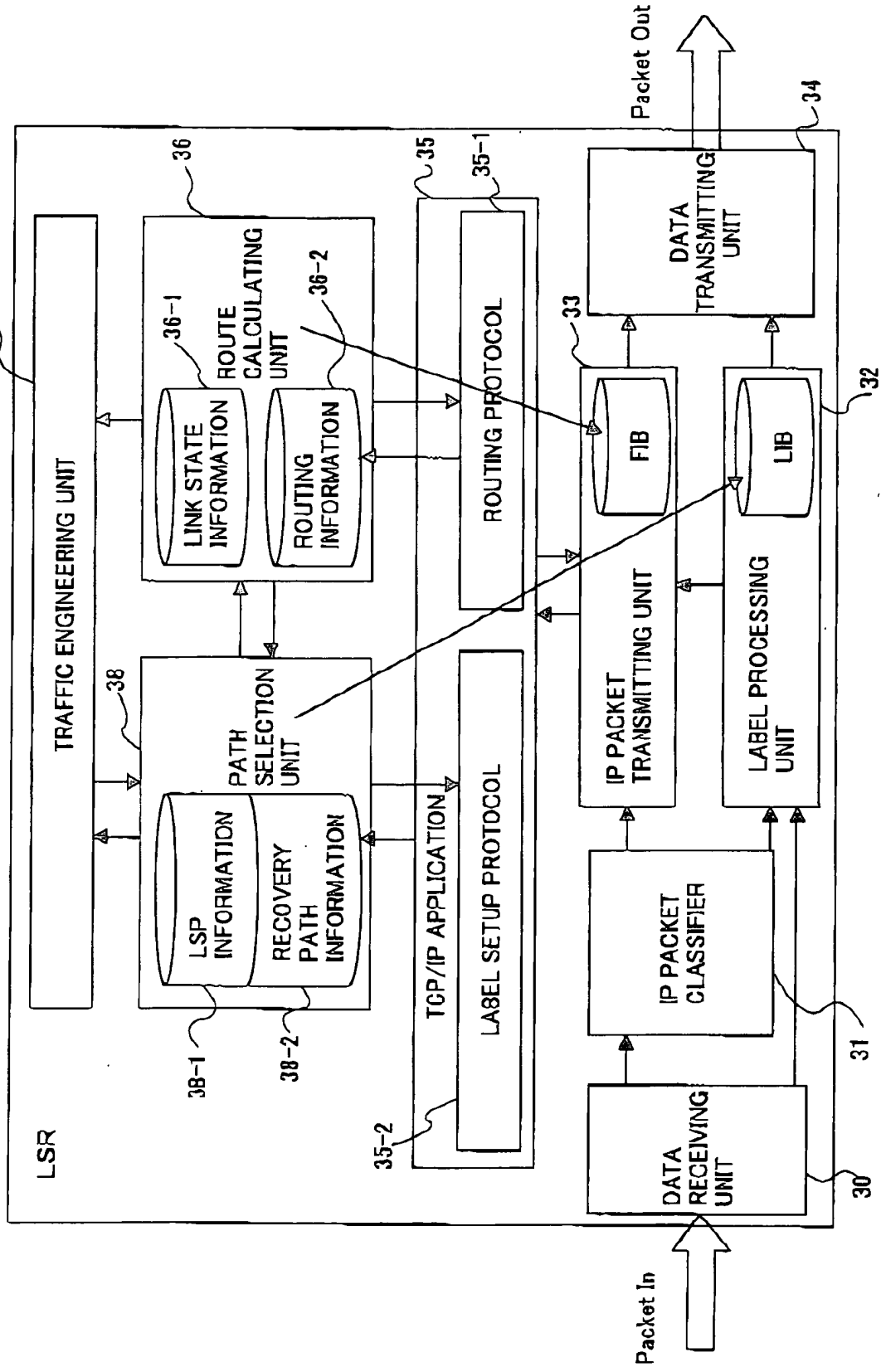


FIG.28

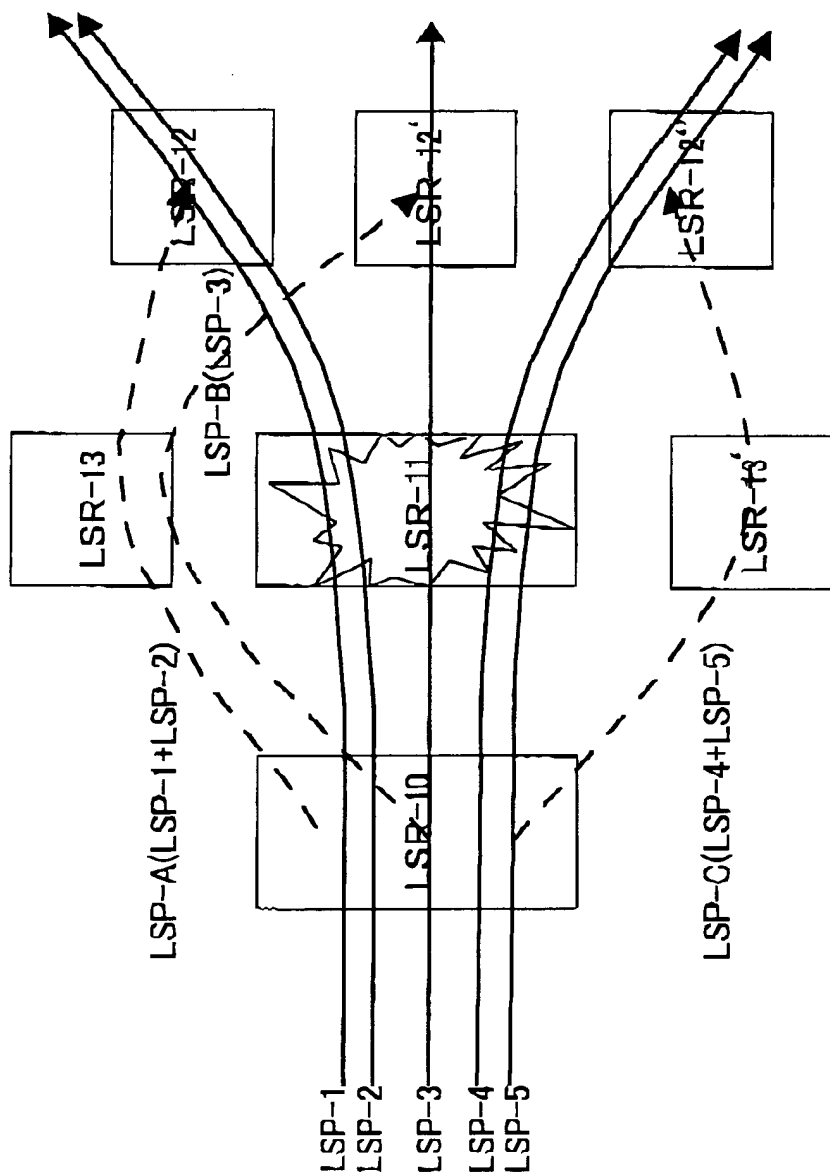


FIG. 29

